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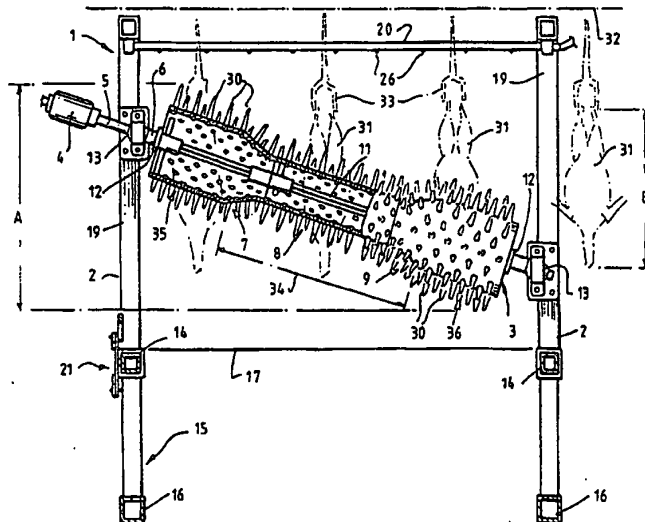
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(54) Title: REMOVAL OF FEATHERS FROM POULTRY



(57) Abstract

A plucking stand (1) for birds is disclosed. The plucking stand (1) includes a frame (2) carrying a pair of spaced plucking drums (3) and drive means (4). The drive means (4) is operably connected to rotate the drums (3) about the respective longitudinal axes thereof. The spacing between the drums (3) is such as to enable plucking fingers projecting from each of the drums (3) to contact a bird passed longitudinally between the drums to pluck feathers from the bird. The drums (3) are disposed at an angle to the path of travel of the bird, whereby the point of contact between the plucking fingers and the bird varies due to the varying angle of the drums (3) with respect to the path of travel of the bird.

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TITLE: REMOVAL OF FEATHERS FROM POULTRY
BACKGROUND OF THE INVENTION

The present invention relates to the removal of feathers from poultry. More particularly the invention relates to the mechanical plucking of poultry.

The terms "bird" and "poultry" are used broadly herein to include chickens, ducks, turkeys, geese, quail, game birds and other birds.

The mechanical plucking of poultry is known. In one well known arrangement birds are passed between opposed banks of rotating discs. Resiliently deformable fingers project from each of the discs. The discs rotate in a plane substantially parallel to the direction of travel of the birds between the opposed banks. The separation between the opposed banks of discs is such that the projecting fingers contact birds passed between the discs and the circular movement of the fingers is effective for the removal of feathers.

However, in this arrangement because of the circular motion of the discs, feathers are liable to be thrown about as they are removed from the bird and tend to become lodged in the equipment. A typical arrangement includes a plurality of electric motors and one or more drive trains so that feathers thrown about by the action of the discs tend to become lodged in the motors, bearings, drive trains and other items of equipment which accordingly require a high degree of maintenance leading to high maintenance costs. Moreover, with such prior art arrangements it is often difficult to adjust the speed of rotation of the discs and to vary the spacing between the banks for birds of different sizes. Further, the array of discs involves significant capital expenditure and a substantially permanent installation.

Other arrangements are known which comprise a pair of opposed, substantially parallel rotating drums having a plurality of picking fingers to remove feathers from poultry. One such typical arrangement is that described in U.S. Patent No. 3,537,128 in the name of Zebarth. This patent, which is directed to a particular arrangement of angled picking fingers, discloses a poultry defeathering apparatus having a pair of opposed straight cylindrical drums, the drums being horizontal and generally parallel - see for example figure 14 of the patent. As with the prior art rotating disc arrangements, this construction does not adequately allow for the varying shape or varying lengths of birds to be accommodated. Accordingly, the defeathering process has been found

to be generally less than satisfactory to commercial poultry producers.

SUMMARY OF THE INVENTION

The present invention accordingly provides in one embodiment a plucking stand for birds, said plucking stand including a frame carrying a pair of spaced plucking drums and drive means, the drive means being operably connected for rotating said drums about the respective longitudinal axes thereof wherein the spacing of said drums is such as to enable plucking fingers projecting from each of said drums to contact a bird passed longitudinally between the drums whereby to pluck the feathers therefrom, said drums being at an angle with respect to the path of travel of the bird, whereby the point of contact between the plucking fingers and the bird varies due to the varying angle of the drums with respect to the path of travel of the bird.

Each of the drums is preferably substantially cylindrical. The drums may be adapted for receiving a plurality of resiliently deformable fingers by the provision of a plurality of apertures through the surface of each drum. Suitable resiliently deformable rubber fingers are already known for use with discs for plucking poultry and the drums of the present invention may be adapted for receiving the known prior art fingers.

In the present invention the arrangement of fingers is preferably such that the fingers project radially outwardly from the surface of each drum. The fingers may be of a uniform length or of varying lengths. When fingers of varying lengths are used, these may be randomly arranged to provide a degree of buffeting of the bird or may be arranged in particular patterns such as a helical pattern to facilitate the plucking action.

Each drum may be substantially cylindrical along its length or may be of varying diameters. In one preferred arrangement each drum has a waisted central portion of smaller diameter than the portions at either end of the drum. This latter arrangement has been found to be particularly effective, as the drum so arranged generally follows the contour of the bird as the drum rotates and the bird traverses the apparatus. In an alternative arrangement, the drums may be of substantially constant cross-section, and the plucking fingers may be arranged such that they are of a shorter length around the waisted central portion of the drum, whilst the fingers at either end portion of the drum are longer, so as to achieve the desired plucking effect.

Preferably each drum is divided into a plurality of segments. The segments may be held together on a central drive shaft and may facilitate the removal and installation of the resiliently deformable plucking fingers. The fingers may need to be changed for birds of different types due to the varying ease or difficulty of removing feathers from different birds which require fingers of varying resilience.

Each drum or drum segment is preferably substantially hollow allowing access to the inside of the drum or drum segment whereby to facilitate installation and removal of fingers through apertures in the drum surface.

In a particularly preferred arrangement each drum is approximately 1.5m in length having a diameter of from 200-300mm and most preferably about 250mm at either end and from 150-250mm and most preferably about 200mm in a waisted central portion.

Each drum may incorporate a central drive shaft and the drum segments may be held together to form a single drum during operation by the provision of holding means adapted for holding the drum segments in assembled relationship on the shaft. The holding means may typically include a disc-like member adapted for projecting radially outwardly from the shaft and movable longitudinally with respect to the shaft whereby a drum may be sandwiched between a pair of such disc members which when secured relative to the shaft mount the drum on the shaft. The holding means may accordingly take the form of a locking collar. Other means for mounting the drum on the shaft are also envisaged within the scope of the present invention.

The central drive shaft may further include bearings for mounting the shaft relative to the frame. A separate bearing is preferably provided at either end of a drum according to the present invention. Each bearing is preferably a sealed bearing and most preferably a self centering sealed bearing. Most preferably the bearings incorporate locking means such as a locking collar to lock the bearing to the shaft. An eccentric locking collar is particularly suitable for use in accordance with the invention.

The drums may each be mounted between the ends of a frame. The frame may include a pair of separated arms at each end of the frame whereby each drum is journaled for rotation between arms at either end of the frame.

The arrangement is preferably such that the drums may each be mounted at a varying angle to the horizontal. Preferably the arrangement is such that the angle of each drum to the horizontal may be varied between 10° and 60° and during use is most preferably in the range of 30° to 45° to the horizontal.

The angle of the drums with respect to the path of travel of the bird has been found to vary depending on the length of the apparatus. For example, for an apparatus of relatively short length, drums disposed at a greater angle have been found preferable to achieve an acceptable level of feather removal, whilst for a longer apparatus a shallower drum angle is generally preferable to achieve an acceptable level of feather removal.

The angle of the drum is preferably such that as a bird suspended from a shackle or other means is passed on a processing line longitudinally between the drums the point of contact between the plucking fingers and the bird varies due to the varying angle of the drum relative to the direction of travel of the bird. Typically birds are suspended by the legs from a moving processing line in which case the drum is preferably angled so as to be higher as the bird enters the nip between the pair of drums whereby the fingers initially contact the bird in the leg area and as the bird continues to be moved longitudinally between the drums by the processing line the drums are angled downwardly so that the point of contact progressively moves down from the legs toward the neck of the bird. As the lengths of different types of birds varies considerably, varying the angle of the drums enables variations in the length of bird and hence type of which can be passed longitudinally along the nip between a pair of drums.

Most preferably each of the pair of drums is arranged at the same angle to the horizontal as one another.

The angle of the drums is preferably adjustable. The drum angle may be adjusted by suitable mounting members at one or both ends of the frame.

Preferably the effective contact length of the drums for contact between the opposed plucking fingers and the bird to enable defeathering is not substantially greater than the length of the bird to be plucked.

Although it has been convenient to describe the invention in relation to a single pair of drums, it is be appreciated that a plurality of

pairs of drums may be longitudinally arranged either within one frame or in separate frames whereby each bird may pass longitudinally between a plurality of pairs of drums.

The preferred drum arrangement may be dependent upon the particular birds being plucked and the speed of the line carrying the birds between the drums as well as upon the speed of rotation of each drum. The exposure time of each bird to the rotating fingers of a drum is preferably in the region of between 10 and 30 seconds and most preferably about 20 seconds.

If the drums are rotated too quickly the speed of movement of the fingers may damage the skin of the bird. Therefore for a fast moving processing line it may be preferable to lengthen the drums, place a second pair of drums on the frame or to add one or more additional units down stream of the first unit.

At each end of the frame a pair of arms is provided wherein a bird hanging from the processing line may pass between the arms. Each arm at each end carries one end of the central drive shaft. The arms are preferably adjustable whereby to vary the distance between the drums, ie. the width of the nip, to accommodate birds of varying sizes.

The construction and arrangement according to the present invention may be such that the respective drums rotate in opposite directions, the direction of rotation being such that feathers are directed downwardly. This can be achieved by the left-hand drum in an end view rotating clockwise and the right-hand drum rotating anti-clockwise so that in the nip between the drums, the fingers of both drums are pulling downwardly on a bird suspended between the drums from a processing line.

The frame may be adjusted for movement of the respective arms at either end toward or away from one another by mounting each arm for slidable movement on a transverse guide or guides. An articulated lever arrangement adapted for pivoting about a central point to move both arms substantially simultaneously toward or away from one another may be provided.

Preferably the frame carries a plurality of spray bars connectable to a water supply whereby to spray water onto each drum so that the action of the plucking fingers against the bird is lubricated. The spray bars may be conveniently located on each arm of the frame.

The drive means preferably comprises hydraulic drive means. The hydraulic drive means may be powered externally of the processing area. An electric motor may be provided for driving an hydraulic pump whereby hydraulic fluid is drawn from a reservoir and pumped under pressure in known manner through hydraulic lines to an hydraulic motor drivingly engaging each drum. The speed of rotation of the drums may be varied by varying the speed of the hydraulic motors driving each drum. Most preferably each drum is driven by a separate hydraulic motor.

In another embodiment, the present invention provides a plucking stand for birds, said plucking stand including a frame carrying a pair of spaced plucking drums having axes of rotation which are substantially parallel to each other and drive means, the drive means being operably connected for rotating said drums in opposite directions about the respective longitudinal axes thereof wherein the spacing of said drums is such as to enable plucking fingers projecting from each of said drums to contact a bird passed substantially horizontally between the drums whereby to pluck the feathers therefrom, the axes of rotation of the drums being substantially parallel to the plane of the path of travel of the bird, wherein said drums are at an angle with respect to the path of travel of the bird, the angle being selected so that the effective contact length of the drums for contact of the bird between the opposed plucking fingers of the drums is not substantially greater than the length of the bird, said drums including a waisted central portion of smaller diameter than the portions at either end of said drums.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

To further assist in the understanding of the present invention, particularly preferred embodiments of the invention will now be described in relation to the accompanying drawings.

In the drawings in which like features are indicated by common numerals,

FIGURE 1 is a schematic end view of a plucking stand according to one embodiment of the present invention;

FIGURE 2 is a schematic side view of the embodiment of Figure 1 taken along the line 2-2 of Figure 1;

FIGURE 3 is a partly cut-away side view of a typical drum assembly according to one embodiment of the present invention; and

FIGURE 4 is an end view of a typical drum assembly in accordance with one embodiment of the invention, taken along the line 4-4 of Figure 3.

In the embodiment illustrated in the drawings a plucking stand 1 includes a frame 2 carrying a pair of spaced drums 3 and drive means 4. The drive means 4 comprises an hydraulic drive motor coupled via coupling means 5 to shaft 6 which extends through each of drums 3. Hydraulic drive motor 4 is powered from hydraulic lines (not shown) which contain pressurised fluid from a reservoir and pump powered by a remote electric motor or other suitable power means. The power means may be located externally of the processing area whereby to avoid water, feathers and the like coming into contact with the power source.

The central drive shaft 6 extends longitudinally through the drum 3. Drum 3 contains an array of apertures 7 which are adapted for receiving fingers 30. Each finger 30 is of resiliently deformable material, preferably a form of rubber. The resiliently deformable fingers 30 may be of varying lengths typically in the region of 3 inches to 5 inches and may be substantially smooth or textured. Each finger 30 may include a radially-projecting flange whereby when the finger 30 is passed from the inside of the drum through an aperture the flange may abut the inner surface of the marginal edge of the aperture 7 in hollow cylindrical drum 3 while the resiliently deformable finger 30 projects radially outwardly therefrom.

Drum 3 comprises drum segments 8 and 9. Each drum segment comprises a drive wheel 10 at either end of the segment. The drive wheel 10 is mounted on the shaft for rotation therewith by a key-way 11, although other mounting arrangements known in the art are also envisaged within the scope of the present invention. A blocking collar 12 may be provided at either end of drum 3 whereby to retain the drum segments 8 and 9 in the assembled relationship shown in Figure 2.

Central drive shaft 6 may also carry a bearing 13 at either end of drum 3. Bearing 13 is preferably a self aligning bearing and most preferably a sealed self aligning bearing. The bearing may be adapted for mounting the drive assembly on frame 2 in the manner illustrated in Figures 2 and 3. Frame 2 comprises stand means 15 which comprises legs 16 at either end of frame 2 and interconnecting longitudinal member 17.

Two sets of arm members 18 are mounted on cross-member 14 of stand means 15. Arm means 18 each comprise upwardly extending arms 19 at either end of plucking stand 1 and a longitudinal joining member 20. Each arm means 18 is slidably mounted on cross member 14. An arm spacing means 21 may be provided for spacing arms 18 and hence drums 3 relative to one another.

The arm spacing means 21 generally comprises an articulated lever arrangement adapted for pivoting about a central point to move the arms 19 substantially simultaneously toward or away from each other. In the embodiment shown, arm spacing means 21 is in the form of a frame adjuster comprising a lever 22 operable through fulcrum 23 and articulated extension bars 24 and 25 for the movement of arms 19 relative to one another as the lever is raised or lowered. In the arrangement shown in the drawings the arms 19 are as close to one another as allowed by the frame adjuster 21 and raising lever 22 in the direction indicated by the arrow in Figure 1 separates the arms further from one another to allow larger birds to pass longitudinally in the nip between drums 3.

Drums 3 are each rotated by drive means 4 in the form of an hydraulic motor. Drums 3 counter-rotate in the directions indicated by the arrows which extend through the nip of drums 3 in Figure 1. In the end view shown in Figure 1 the left-hand drum rotates clockwise and the right-hand drum anti-clockwise so that in the nip both drums 3 are revolving downwardly. Thus a bird 31 (see in particular Figure 2) suspended from a processing line 32 via shackle 33 and projecting between drums 3 will have downward force applied by drums 3 whereby to remove feathers from the bird 31 suspended from the processing line 32. The direction of rotation will have the effect of directing plucked feathers downwardly toward the floor.

The arms 19 also carry spray bars 26 which are adapted for providing a spray of water downwardly onto a bird passing between drums 3.

The construction and arrangement is such that plucking stand 1 provided by the present invention may be utilised with an existing processing line and need not be a permanent fixture. Thus processing lines adapted for other applications may be advantageously utilised with the plucking stand provided by the present invention.

In addition, by varying the angle of drums 3 from that shown in the drawings, the length of bird 31 which can be accommodated between the drums can be varied, thereby making the line readily adaptable for birds of varying sizes.

As can be seen from figure 2, the effective contact length 'A' of the drums 3 with the bird 31 during its path of travel through plucking stand 1 is not substantially greater than the length 'B' of a bird 31 of typical size. The angle of the drums 3, and hence the effective contact length of the drums 3 with the bird 31, may be adjusted for differing sizes of bird 31.

In the arrangement illustrated drums 3 are shown as having a waisted central portion 34. The waisted central portion 34 is of smaller diameter to the portions 35 and 36 at either end of the drums 3. This latter arrangement has been found to be particularly effective, as the drums 3 so arranged generally follow the contour of the bird 31 as the drums rotate and the bird 31 traverses the apparatus. Waisted central portion 34 can be constructed as a segment of drum 3, as can end portions 35 and 36. The waisted central portion 34 and end portions 35 and 36 so segmented can be placed together to form an assembled drum 3.

It can also be seen from the drawings that apertures 7 extend substantially over the whole outer surface of drums 3.

By having the electric motor or other power source operating the drums via a hydraulic system, the electrics may be removed from the moist environment of the plucking operation and the prospects of stray feathers, water and the like becoming embedded in the bearings or the motor is significantly reduced.

The hydraulic motors should not be adversely affected by any feathers or moisture and the bearings are preferably of a sealed type having reduced maintenance. The plucking stand provided by the present invention accordingly involves a considerably lesser amount of maintenance than the previously known prior art rotating discs and is easier to adjust for speed by varying the speed of the hydraulic motors. Moreover, the drums may be readily removed and replaced whereby if the length of fingers needs to be changed a separate drum can be mounted with the new fingers and a replacement of a drum on the frame takes a relatively short time compared with the downtime experienced in changing fingers with the known prior art rotating disc method.

While it has been convenient to describe the invention herein in relation to particular preferred embodiments, it is to be appreciated that other constructions and arrangements are also considered as falling within the scope of the invention. Various modifications, alterations, variations and/or additions to the constructions and arrangements described herein are also considered as falling within the ambit and scope of the present invention.

CLAIMS

1. A plucking stand for birds, said plucking stand including a frame carrying a pair of spaced plucking drums and drive means, the drive means being operably connected for rotating said drums about the respective longitudinal axes thereof wherein the spacing of said drums is such as to enable plucking fingers projecting from each of said drums to contact a bird passed longitudinally between the drums whereby to pluck the feathers therefrom, said drums being at an angle with respect to the path of travel of the bird, whereby the point of contact between the plucking fingers and the bird varies due to the varying angle of the drums with respect to the path of travel of the bird.
2. A plucking stand according to claim 1, wherein said drums are angled with respect to the path of travel of the bird so as to contact a region of the bird which enters the nip between the drums and are angled in the direction of travel of the bird so that the point of contact between the plucking fingers and the bird progressively moves over the length of the bird.
3. A plucking stand according to claim 1, wherein the bird travels in a substantially horizontal path, and the angle of said drums to the horizontal is in the range of 10° to 60° .
4. A plucking stand according to claim 2, wherein the bird travels in a substantially horizontal path, and the angle of said drums to the horizontal is in the range of 10° to 60° .
5. A plucking stand according to claim 3, wherein said angle is in the range of 30° to 45° .
6. A plucking stand according to claim 4, wherein said angle is in the range of 30° to 45° .
7. A plucking stand according to claim 1, wherein said drums rotate in opposite directions such that the bird is drawn into the nip between the drums.
8. A plucking stand according to claim 1, wherein the axes of rotation of the drums are substantially parallel, and are substantially parallel to the plane of the path of travel of the bird.
9. A plucking stand according to claim 1, wherein said drums each have a waisted central portion of smaller diameter than the portions at either end of said drums.
10. A plucking stand according to claim 1, wherein said drums include a plurality of apertures through the surface of each drum to receive a

plurality of said plucking fingers.

11. A plucking stand according to claim 1, wherein each drum is divided into a plurality of segments.

12. A plucking stand according to claim 11, wherein each drum incorporates a central drive shaft, and said drum segments are held together to form a single drum during operation by the provision of holding means adapted for holding the drum segments in assembled relationship on the central drive shaft.

13. A plucking stand according to claim 12, wherein said holding means comprises a locking collar.

14. A plucking stand according to claim 1, wherein said plucking fingers project radially outwardly from the surface of each drum.

15. A plucking stand according to claim 14, wherein said plucking fingers are of uniform length.

16. A plucking stand according to claim 14, wherein said plucking fingers are of varying length.

17. A plucking stand according to claim 1, wherein the effective contact length of the drums for contact between the opposed plucking fingers and the bird to enable defeathering is not substantially greater than the length of the bird.

18. A plucking stand according to claim 1, wherein said frame is adjustable to permit the spacing between the drums to be varied.

19. A plucking stand according to claim 18, wherein said frame includes arms at either end of the frame adjustable for slidable movement on transverse guides.

20. A plucking stand according to claim 19, wherein said adjustment is performed by an articulated lever arrangement adapted for pivoting about a central point to move said arms substantially simultaneously toward or away from each other.

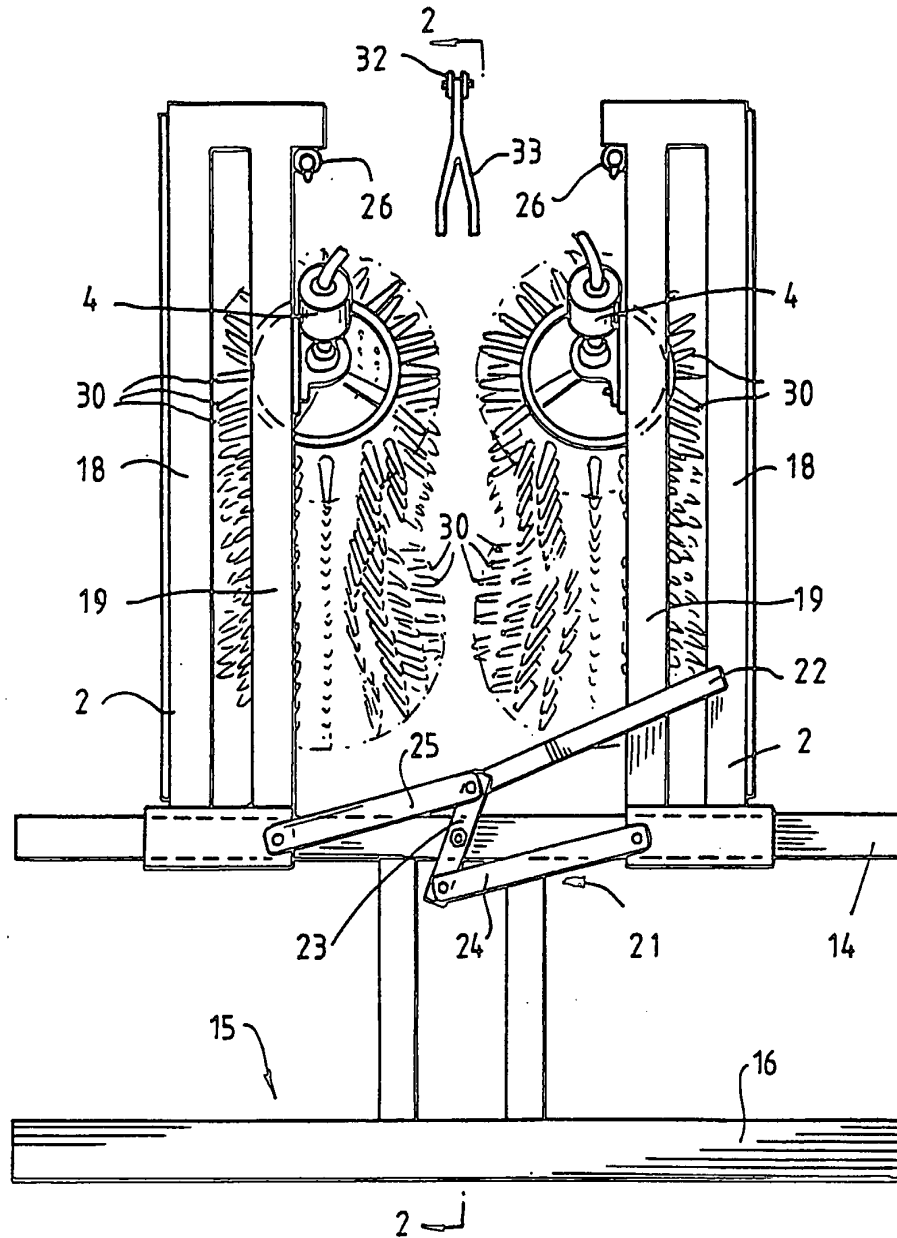
21. A plucking stand according to claim 1, wherein said frame carries a plurality of spray bars connectable to a water supply whereby to spray water onto said drums to lubricate the action of the plucking fingers with respect to the bird.

22. A plucking stand according to claim 1, wherein said drive means is external of said plucking stand.

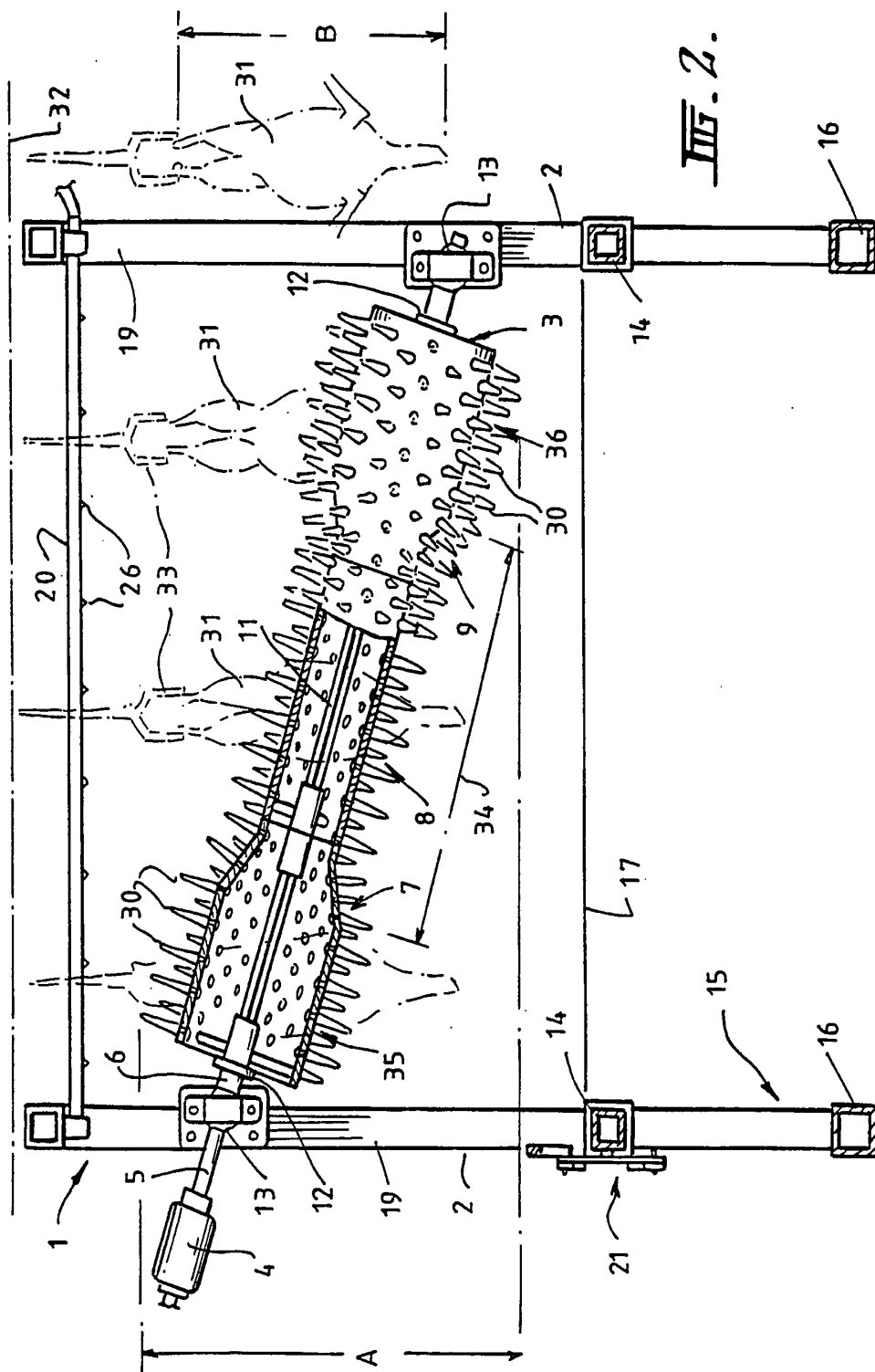
23. A plucking stand according to claim 1, wherein the angle of said drums is adjustable.

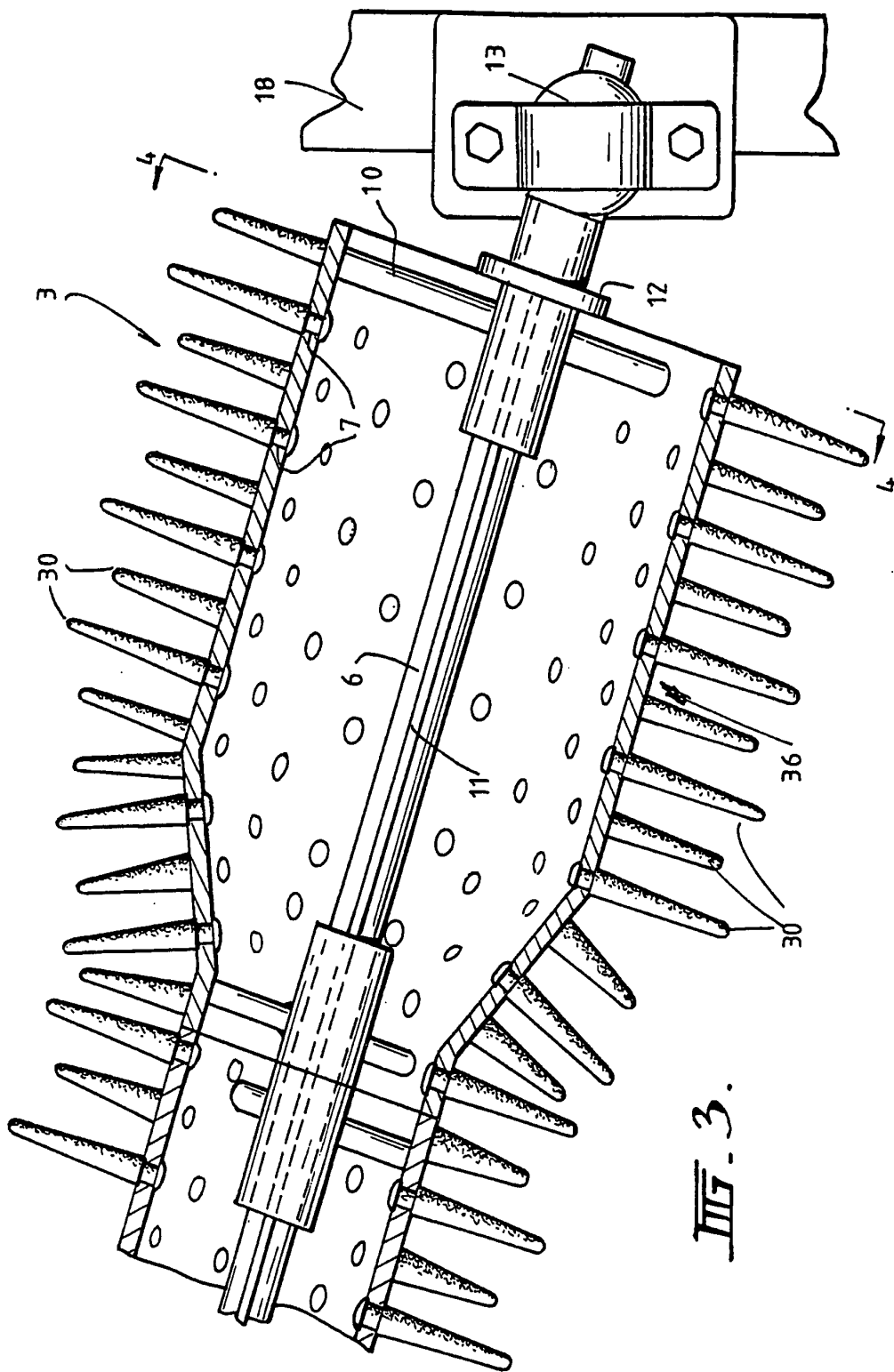
24. A plucking stand for birds, said plucking stand including a frame

carrying a pair of spaced plucking drums having axes of rotation which are substantially parallel and drive means, the drive means being operably connected for rotating said drums in opposite directions about the respective longitudinal axes thereof wherein the spacing of said drums is such as to enable plucking fingers projecting from each of said drums to contact a bird passed substantially horizontally between the drums whereby to pluck the feathers therefrom, the axes of rotation of said drums being substantially parallel to the plane of the path of travel of the bird, and wherein said drums are at an angle with respect to the path of travel of the bird, the angle being selected so that the effective contact length of the drums for contact between the opposed plucking fingers and the bird is not substantially greater than the length of the bird, said drums including a waisted central portion of smaller diameter than the portions at either end of said drums.



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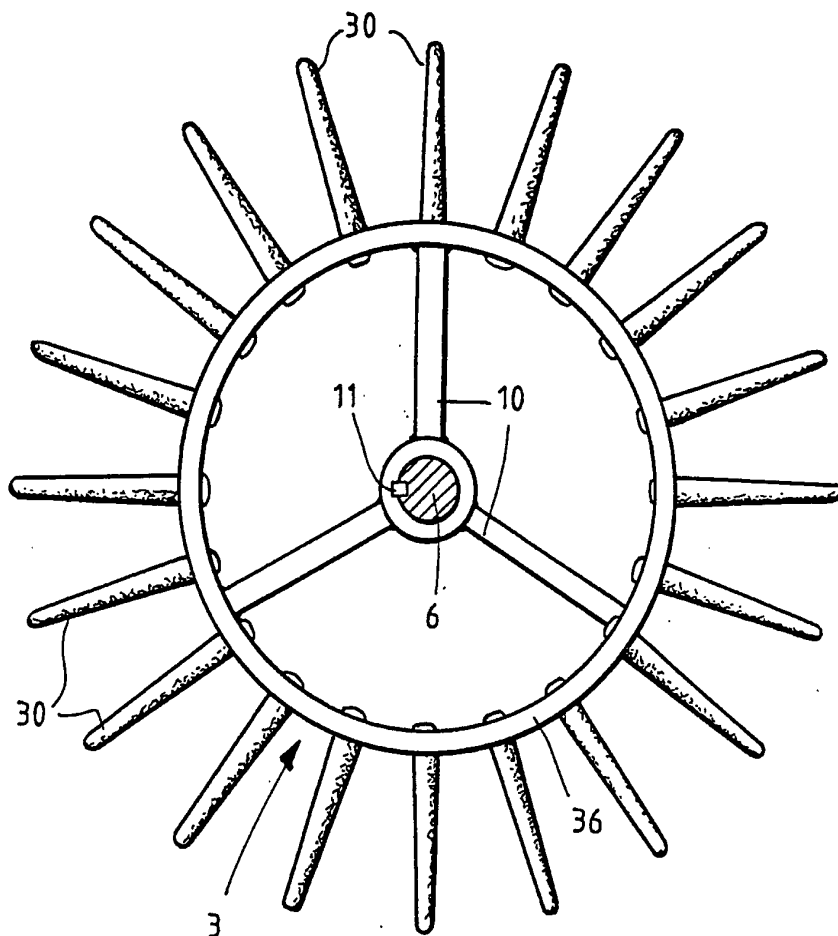



FIG. 4.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 94/00313

A. CLASSIFICATION OF SUBJECT MATTER Int. Cl. ⁶ A22C 21/02 According to International Patent Classification (IPC) or to both national classification and IPC					
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) Int. Cl. ⁶ A22C 21/02 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)					
C. DOCUMENTS CONSIDERED TO BE RELEVANT					
Category^o	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.			
X	DE,A,1429917 (Gainesville Machine Company Inc.) 28 November 1968 (28.11.68) Figure 1	1-8,10-15,17,22,24			
X	US,A,1889228 (Swanson) 29 November 1932 (29.11.32) page 1 line 90 - page 2 line 15, page 2 lines 50-73, Figs. 1-3	1-8,14,15,17,22,24			
X	GB 1203610 (C.I.M.A. Construzioni Italiane Macchine Avicole S.r.l.) 26 August 1970 (26.08.70) page 2 lines 15-27, Fig. 1	1-4,7,8,10-15,17,22,24			
<div style="display: flex; justify-content: space-between;"> <div> <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. </div> <div> <input type="checkbox"/> See patent family annex. </div> </div>					
<table style="width: 100%; border: none;"> <tr> <td style="width: 33%; vertical-align: top;"> * Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 33%; vertical-align: top;"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family </td> <td style="width: 33%;"></td> </tr> </table>			* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family	
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Date of the actual completion of the international search 9 September 1994 (09.09.94)		Date of mailing of the international search report 6 OCTOBER 1994 (6.10.94)			
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 94/00313

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to Claim No.
A	FR,A,2653302 (Bayle) 26 April 1991 (26.04.91) Whole document	24,9
X Y	FR,A,2643791 (Bayle) 7 September 1990 (07.09.90) Whole document	1-8,10-15,17-19,22-24 16
Y	AU,B,4317/42 (116500) (LUKE) 11 February 1943 (11.02.43) Whole specification	14-16
X	Derwent Soviet Inventions Illustrated, No. 14, 1961, issued 22 December 1961 SU,A,139788 (MOTYLENOK) 9 November 1960 (09.11.60) Abstract	1